

## 6-4 Completing the Square

ex 1

$$\sqrt{(x-5)^2} = \sqrt{4}$$

$$x-5 = \pm 2$$

$$x = 5 \pm 2$$

$$x=7 \quad x=3$$

FOIL

$$x^2 - 10x + 25 = 4$$

$$x^2 - 10x + 21 = 0$$

$$(x-7)(x-3) = 0$$

$$x=7 \quad x=3$$

ex 2

$$\sqrt{(x-3)^2} = \sqrt{7}$$

$$x-3 = \pm\sqrt{7}$$

$$x = 3 \pm \sqrt{7}$$

ex 3

$$\sqrt{(2x-3)^2} = \sqrt{5}$$

$$2x-3 = \pm\sqrt{5}$$

$$2x = 3 \pm \sqrt{5}$$

$$x = \frac{3 \pm \sqrt{5}}{2}$$

ex 4

$$x^2 - 6x - 3 = 0$$

$$x^2 - 6x + 9 = 3 + 9$$

$$x^2 - 6x + 9 = 12$$

$$\sqrt{(x-3)^2} = \sqrt{12}$$

$$x-3 = \pm 2\sqrt{3}$$

$$x = 3 \pm 2\sqrt{3}$$

$$ax^2 + bx + c = 0$$

Steps

1. Transform equation so constant (c) is alone on right side.

2. If  $a \neq 1$ , then divide both sides by a.

3. Add the square of one-half b to both sides.

4. Factor left side.  $\rightarrow (x \pm \frac{1}{2}b)^2$ 

5. Solve.

ex 5

$$x^2 - 5x + 3 = 0$$

$$\left(\frac{-5}{2}\right)^2$$

$$\frac{-12}{4}$$

$$x^2 - 5x + \frac{25}{4} = -3 + \frac{25}{4}$$

$$\sqrt{\left(x - \frac{5}{2}\right)^2} = \sqrt{\frac{13}{4}}$$

$$x - \frac{5}{2} = \pm \frac{\sqrt{13}}{2}$$

$$x = \frac{5 \pm \sqrt{13}}{2}$$

ex 6

$$2x^2 + 2x + 5 = 0$$

÷ 2

$$x^2 + x + \frac{5}{2} = 0$$

$$x^2 + x + \frac{1}{4} = -\frac{5}{2} + \frac{1}{4}$$

$$\sqrt{\left(x + \frac{1}{2}\right)^2} = \sqrt{-\frac{9}{4}}$$

$$x + \frac{1}{2} = \pm \frac{3i}{2}$$

$$x = \frac{-1 \pm 3i}{2}$$

Do

1.  $3x^2 + 12x + 1 = 0$

$$-2 \pm \frac{\sqrt{37}}{3}$$

$$-2 \pm \sqrt{\frac{11}{3}}$$

$$\frac{\sqrt{11}}{\sqrt{3}} \frac{\sqrt{3}}{\sqrt{3}}$$

2.  $x^2 - x - 1 = 0$

$$x = \frac{1 \pm \sqrt{5}}{2}$$

$$x^2 - x + \frac{1}{4} = 1 + \frac{1}{4}$$

$$\left(x - \frac{1}{2}\right)^2 = \frac{5}{4}$$

$$x - \frac{1}{2} = \pm \frac{\sqrt{5}}{2}$$

$$x = \frac{1 \pm \sqrt{5}}{2}$$

HW  
p311  
33-47odd